

CWP - Chemical Weapons

CWP-C COMPLICATIONS

OUTCOME: The patient/family will understand the potential consequences of exposure to a chemical weapon.

STANDARDS:

1. Discuss with the patient/family the complications that may occur after exposure to chemical weapons as appropriate.

CWP-CM CASE MANAGEMENT

OUTCOME: The patient/family/caregiver will understand the importance of integrated case management in achieving physical and behavioral health.

STANDARDS:

1. Discuss roles and responsibilities of each member of the care team including the patient, family/caregiver, and providers in the case management plan.
2. Explain the coordination and integration of resources and services in developing and implementing the case management plan.
3. Explain the need to obtain the appropriate releases of information necessary to support integrated case management and to maintain patient privacy and confidentiality. **Refer to AF-CON.**

CWP-CUL CULTURAL/SPIRITUAL ASPECTS OF HEALTH

OUTCOME: The patient/family will understand the impact and influences cultural and spiritual traditions, practices, and beliefs have on health and wellness.

STANDARDS:

1. Explain that the outcome of disease processes may be influenced by choices related to health and lifestyles, e.g., diet, exercise, sleep, stress management, hygiene, full participation in the medical plan.
2. Discuss the potential role of cultural/spiritual traditions, practices and beliefs in achieving and maintaining health and wellness.
3. Explain that traditional medicines/treatments should be reviewed with the healthcare provider to determine if there are interactions with prescribed treatment.

4. Explain that the medical treatment plan must be followed as prescribed to be effective and that some medications/treatments take time to demonstrate effectiveness.
5. Discuss that traditions, such as sweat lodges, may affect some conditions in detrimental ways. Healing customs or using a traditional healer may have a positive effect on the patient's condition.
6. Refer to clergy services, traditional healers, or other culturally appropriate resources.

CWP-DP DISEASE PROCESS

OUTCOME: The patient/family will understand the expected course of disease resulting from exposure to the chemical weapon.

STANDARDS:

1. Provide an overview of the suspected chemical weapon. Discuss the time course and clinical features of the suspected chemical weapon as appropriate.

- a. **NERVE AGENTS**

The extent of the poisoning depends on the amount of chemical to which a person was exposed, how the person was exposed, and the length of the exposure. Exposure to low or medium doses can produce runny/watery eyes, pinpoint pupils, eye pain, blurred vision, drooling, excessive sweating, cough, chest tightness, rapid breathing, diarrhea, increased urination, confusion, drowsiness, weakness, headache, nausea, vomiting, abdominal pain, change in heart rate, change in blood pressure. Exposure to a large dose of nerve agents can cause loss of consciousness, convulsions, paralysis, or respiratory failure with the possibility of leading to death. Mild or moderately exposed individuals usually recover completely, but severely exposed individuals are not likely to survive.

- i. **Tabun:** symptoms can occur within a few seconds if exposed to the vapor form, and a few minutes to up to 18 hours after being exposed to the liquid form.
- ii. **Sarin:** is one of the most volatile nerve agents, and can easily transform from a liquid in to a vapor and spread in to the environment. Even a small drop of Sarin can cause sweating and muscle twitching where it touches the skin.
- iii. **Soman:** exposure can occur through skin contact, eye contact, or inhalation. It mixes easily with water and can be used to poison water, or it can also be used to poison with. Victim's clothes can release Soman for up to 30 minutes following exposure, rendering them toxic and likely to infect others. Repeated exposure can lead to accumulation of the chemical in the body due to its slow elimination. Soman vapor is thicker than air, and thus usually settles closer to the ground.

- iv. **VX:** Symptoms can be expected from 4 to 14 hours following exposure to VX. Of all the nerve agents, VX is the most volatile and can be easily transformed into gas. It is also the most toxic and more likely to produce the lethal side effects following exposure.

b. **BLISTER/VESICANT AGENTS**

The most likely routes of exposure to blister/vesicant agents are inhalation, dermal contact, and ocular contact. The severity of symptoms will be dependant upon the amount and route of exposure, as well as the pre-morbid condition of the victim.

- i. **Lewisite:** Exposure can occur by skin or eye contact, or breathing in contaminated air. Pain and irritation can occur within seconds, redness within 15 to 30 minutes, followed by blister formation up to several hours later. The blister will eventually become large enough to cover the initial red area. The lesions produced by exposure to Lewisite heal faster, and leave less discoloration. The eyes may become irritated, painful, and swollen with the likelihood of tearing. Patients may also experience runny nose, sneezing, hoarseness, bloody nose, sinus pain, shortness of breath, and cough. Nausea, Vomiting, and diarrhea could be expected, as well as low blood pressure (“Lewisite shock”).
- ii. **Sulfur Mustard:** sulfur mustard can be carried through the wind over great distances, and can also contaminate water. Exposure to sulfur mustard is usually not fatal. Depending upon the severity of the exposure. The victim may not experience symptoms for up to 2 to 24 hours. Sulfur can cause redness and itching of the skin within 2 to 48 hours of exposure, which may eventually lead to yellow blistering of the skin. The eyes may become irritated, painful, swollen and tearful within the first 3 to 12 hours of a mild to moderate exposure. A severe exposure could result in symptoms occurring within 1 to 2 hours of exposure, and could include light sensitivity, severe pain, or blindness that could be present for up to 10 days following the initiation of symptoms. Runny nose, sneezing, hoarseness, bloody nose, sinus pain, shortness of breath, and cough within 12 to 24 hours of a mild exposure and within 2 to 4 hours of severe exposure can occur. Abdominal pain, diarrhea, fever, nausea, and vomiting may be present. Exposure to the liquid form is more likely to result in second and third degree burns and scarring than is exposure to the vapor form of Sulfur mustard. Excessive inhalation of the vapor can lead to long-term respiratory disorders, repeated respiratory infections, or even death. Lengthy exposure to the eye can cause permanent blindness. Exposure to Sulfur mustard places an individual at higher risk for respiratory and lung cancer.
- iii. **Nitrogen Mustards:** These can be found in a variety of forms; oily liquids, vapor, or solid, and with a variety of different smells. The symptoms of Nitrogen exposure usually do not occur immediately, and can take up to several hours to manifest themselves. Skin can become

reddened within a few hours, and could be followed by blistering within 6 to 12 hours. The eyes may become irritated, painful, swollen, and tearful, with high amounts of exposure causing blindness. Nose and sinus pain, coughing, sore throat, and shortness of breath may occur within hours. Abdominal pain, nausea, vomiting, diarrhea. Under extreme circumstances, individuals could experience tremors, in coordination, and seizures. The liquid form is more likely to produce second or third degree burns that are more likely to leave scarring later. Excess inhalation of the vapors can cause long-term respiratory disorders, and excess exposure to the eyes can cause chronic eye problems. Exposure has been associated with bone marrow suppression beginning as early as 3 to 5 days following the exposure, which can lead to anemia, bleeding, and increased risk for infection. Prolonged exposure to nitrogen mustards has been linked to leukemia.

- iv. **Phosgene Oxime:** This can cause instant, excruciating pain of the skin almost immediately upon exposure to the chemical. Within seconds, blanching of the skin surrounded by red rings can occur, and within 15 minutes, the skin develops hives. 24 hours later, the whitened areas of the skin become brown and die, leaving a scab. As the skin heals, the patient may continue to experience itching and pain. Immediately following inhalation, victims should expect runny nose, hoarseness, and sinus pain. Absorbing Phosgene through the skin, or inhaling it can cause pulmonary edema (fluid accumulation in the lungs) with symptoms of shortness of breath and cough.

c. **BLOOD AGENTS**

- i. **Cyanide:** Toxicity from this agent can be achieved through inhalation, contact with poisoned soil, drinking contaminated water, or eating contaminated food. The extent of the poisoning depends upon the route and length of exposure. The most harmful method of toxicity is through inhalation. As the gaseous form evaporates rather quickly, Cyanide is less toxic in large outdoor areas being that it is less dense than air and rises fast. This agent prevents the adequate delivery of oxygen to cells, and can be detrimental to the heart and brain. Upon exposure, the following symptoms can be seen within minutes; rapid breathing, restlessness, dizziness, weakness, rapid heart rate, headache, nausea, and vomiting. As poisoning progresses, respirations become slow and gasping and the skin may appear slightly blue in color. The lungs may become filled with fluid. Central nervous system symptoms usually occur rapidly, and include excitement, dizziness, nausea, vomiting, headache, and weakness. As poisoning progresses, drowsiness, spasms, lockjaw, convulsions, hallucinations, loss of consciousness, and coma may occur. Exposure to larger amounts may cause convulsions, low blood pressure, slow heart rate, loss of consciousness, respiratory failure leading to death. Survivors of serious Cyanide poisoning may develop heart and brain damage. Personality changes, memory deficits, disturbances in voluntary muscle

movements, and the appearance in involuntary muscle movements have also been reported in survivors of Cyanide poisoning. Chronically exposed workers may complain of headache, eye irritation, easy fatigue, chest discomfort, palpitations, loss of appetite, and nosebleeds.

d. **PULMONARY AGENTS**

- i. **Chlorine:** This can be found in industry and in households in the form of bleach, pesticides, rubber, and solvents. The gaseous form can be recognized by its pungent, irritating odor, and it's yellow-green color. Chlorine can manifest its poison effects through skin/eye contact, inhalation, and ingestion of contaminated food or water. The seriousness of the side effects depend on the amount and type of Chlorine exposure. During, or immediately after inhalation of low concentrations victims may experience eye and nasal irritation, sore throat, and coughing. Higher concentration can rapidly lead to respiratory distress with airway constriction, and accumulation of fluid in the lungs. Chlorine can initially increase heart rate and blood pressure, and eventually lead to Cardiovascular collapse due to lack of oxygen. Low exposure the skin can cause burning pain, inflammation, and blisters, while it can cause involuntary blinking, redness, and tearing in the eyes. Following an isolated exposure, lung function can return to near normal in 7-14 days. Though complete recovery usually occurs, a chemical irritant-induced type of asthma known as Reactive airway syndrome (RAS) has occurred in some victims.
- ii. **Phosgene:** The extent of the poisoning depends on how close the victims are to the place where the gas is released, the type, and amount of exposure. Routes of contamination include inhalation, skin/eye contact, and eating/drinking contaminated food or water. According to OSHA, the odor provides insufficient warning of hazardous concentrations. Inhaling low concentrations of Phosgene may initially cause minimal symptoms such as dryness/burning of the throat and cough, which may discontinue once the patient is removed from the source of exposure. However, after a 30 minute up to a 48 hour symptom free interval, some victims may experience rapid worsening of lung function which may include fluid accumulation in the lungs, rapid respiration, or painful cough which may produce frothy white or yellow liquid. Phosgene has also been linked to RAS. Due to any possible accumulation in the lungs, the inadequate supply of oxygen to the body can manifest as damage to the heart and it's important capillaries. If, upon exposure, the victim's skin is wet or moist, it can become irritated and red almost immediately. Liquid Phosgene can result in frostbite. Phosgene vapor can cause redness and tearing of the eye, clouding in the cornea, and perforation. Nausea and vomiting may be experienced. At high levels of exposure, permanent damage to the kidneys and liver can occur. If the victim survives the first 48 hours of exposure, they are likely to survive, but may acquire long term sensitivity to chemical irritants, chronic inflammation and irritation of the bronchioles

(lung tubes), emphysema, and increased susceptibility to infections. Workers exposed to daily high levels of the chemical have been shown to have an increased risk of diseases and death associated with long term lung disorders.

CWP-FU FOLLOW-UP

OUTCOME: The patient/family will understand the importance of follow-up and make a plan to keep follow-up appointments

STANDARDS:

1. Discuss the importance of follow-up care.
2. Discuss procedure for obtaining follow-up appointments.
3. Emphasize the importance of keeping appointments.
4. Encourage the patient to seek further management if:
 - a. Significant worsening of symptoms occurs
 - b. Symptoms last longer than expected

CWP-I INFORMATION

OUTCOME: The patient/family will receive information about chemical weapons as appropriate

STANDARDS:

1. Identify the suspected biological weapon that the patient/family has been exposed to.
 - a. **Tabun:** is a clear, colorless, tasteless liquid that has a slight fruity, almond odor attributed to by the formation of hydrogen cyanide. It may contain 5–20 percent chlorobenzene as solvent and stabilizer. The substance can be absorbed into the body by all routes. Usually liquid in normal state, but will volatilize if heated to form vapor or aerosol. As little as 1 to 10 mls can be lethal.
 - b. **Sarin:** is also a clear, colorless, tasteless liquid, but has no identifiable odor. Sarin is one of the more volatile nerve agents and can easily be transformed in to a gaseous state, rendering it more able to spread through the environment. A persons clothing can release Sarin up to 30 minutes after exposure.
 - c. **Soman:** is a clear, colorless liquid that has been associated with a camphor or rotting fruit odor. It vaporizes in to air easily.
 - d. **VX:** VX is a tasteless oily liquid that is amber in color, and evaporates at a slow rate comparable to the rate at which motor oil would evaporate. Extremely high temperatures are required to make VX evaporate.
 - e. **Lewisite:** an oily colorless liquid in its pure form that may appear amber to black in its impure form. It has an odor similar to geraniums. Lewisite

contains arsenic, and thus has some effects similar to arsenic poisoning, including stomach ailments and low blood pressure.

- f. **Sulfur Mustard:** This can be clear or a yellow-brown colored in its oily liquid or solid state. It can also vaporize and spread through the environment. SM sometimes smells like garlic, mustard, onions, or nothing at all. It can last in the environment for up to 2 days following release in regular weather conditions, but under very cold conditions, it can last for up to weeks or months.
- g. **Nitrogen mustards:** These can be oily liquid, vapor, or solid forms. NM's can smell fishy, musty, soapy, or fruity. They can be clear, pale amber, or yellow in appearance.
- h. **Phosgene Oxime:** This is also known as an urticant or nettle agent due to its ability to produce intense itching and rash, similar to hives, when it comes in contact with skin. In the liquid state, it appears to be yellow in color, while in the solid state it is clear. It is known to possess a disagreeable, irritating odor. It does not last in the environment for long as it breaks down within 2 hours in soil, and within a few days within water.
- i. **Cyanide:** It is a colorless or pale blue liquid at room temperature. Being very volatile, it can readily produce toxic, flammable concentrations at room temperature. It has a distinct bitter almond odor and the ability to perceive it is a genetic trait (20 to 40% of the general population cannot detect Hydrogen Cyanide).
- j. **Chlorine:** This is one of the most commonly manufactured chemicals in the US for uses both industrial and household. It can present as a poisonous gaseous form, which can also be cooled, and pressurized in order to store or transport it. Once this liquid is released, it quickly turns in to the gaseous form that spreads relatively fast, and close to the ground. Chlorine gas has a distinct pungent, irritating odor, much like bleach and usually appears to be yellow-green in color at room temperature. At higher pressures, or temperatures below -30°F , it is a clear, amber-colored liquid. Though Chlorine gas itself is noncombustible, it is a strong oxidizer that can readily form explosive compounds when it comes in to contact with many common substances. Chlorine gas is highly corrosive when it comes in to contact with any dermal surfaces, e.g., skin, eyes. Pure Chlorine is unlikely to be ingested, for it is a gas at room temperature.
- k. **Phosgene:** This is a major industrial chemical used to make plastics and pesticides. At normal room temperature, Phosgene is a poisonous gas. It can be cooled, or pressurized in to a liquid form so that it may be packaged and transported; once opened, it will quickly return to its gaseous state, and spread fast in to the environment close to the ground. The gaseous form may be colorless or pale yellow in color. At low concentrations the gas may smell pleasantly of newly mown hay, but at higher concentrations, it may become a stronger, more unpleasant smell. Phosgene is non-flammable, unless mixed with certain other chemicals.

CWP-L LITERATURE

OUTCOME: The patient/family will receive literature about exposure to chemical weapons.

STANDARDS:

1. Provide the patient/family with literature on exposure to chemical weapons.
2. Discuss the content of the literature.

CWP-M MEDICATIONS

OUTCOME: The patient/family will understand the purpose, proper use, and expected outcomes of prescribed drug therapy.

STANDARDS:

1. Describe the name, strength, purpose, dosing directions, and storage of the medication.
2. Discuss the risks, benefits, and common or important side effects of the medication and follow up as appropriate.
3. Discuss any significant drug/drug, drug/food, and alcohol interactions, as appropriate.
4. Discuss the importance of keeping a list of all current prescriptions and over-the-counter medicines, vitamins, herbs, traditional remedies, and supplements. Encourage the patient to bring this list and pill bottles to appointments for medication reconciliation.

CWP-MNT MEDICAL NUTRITION THERAPY

OUTCOME: The patient and family will understand the specific nutritional intervention(s) needed for treatment or management of this condition, illness, or injury.

STANDARDS:

1. Explain that Medical Nutrition Therapy (MNT) is a systematic nutrition care process provided by a Registered Dietitian (RD) that consists of the following:
 - a. Assessment of the nutrition related condition.
 - b. Identification of the patient's nutritional problem.
 - c. Identification of a specific nutrition intervention therapy plan.
 - d. Evaluation of the patient's nutritional care outcomes.
 - e. Reassessment as needed.
2. Review the basic nutrition recommendations for the treatment plan.
3. Discuss the benefits of nutrition and exercise to health and well-being.

4. Assist the patient/family in developing an appropriate nutrition care plan.
5. Refer to other providers or community resources as needed.

CWP-P PREVENTION

OUTCOME: The patient/family will understand actions that may be taken to prevent exposure to and infection with chemical weapons

STANDARDS:

1. Instruct the patient to avoid contact with people or area's suspected of exposure to chemical weapons.
2. Instruct patient on the importance of hand washing and maintaining appropriate hygiene.
3. Encourage patient to receive recommended medications and/or vaccinations for post-exposure prophylaxis and/or threat of chemical agents as appropriate.
 - a. **Nerve Agents:**
 - i. Pyridostigmine has been used in preparation for possible future exposure to nerve agents. A 30mg tablet every 8 hours (preferable a total of 21 tabs) are to be taken prior to exposure. NAPP helps protect acetyl cholinesterase from the action of nerve agents, and thus serves only to enhance post exposure prophylaxis.
 - ii. Post exposure prophylaxis includes injecting Atropine for its ability to block Ach at muscarinic receptors. Depending on the severity of the symptoms, and the age of the victim, 1 to 4 mg should be administered. Two PAM Cl is used for its ability to block and reverse the bonding of the nerve agent to acetyl cholinesterase, and victims are injected with 600mg IM. The 10mg IM injection of diazepam may be utilized in order to prevent the occurrence of seizures.
 - b. **Blistering Agents/Vesicants:**
 - i. There are no known antidotes for these agents and post exposure support e.g., ventilation.
 - c. **Blood Agents:**
 - i. Sodium Nitrite 300mg IV over 3 minutes and Sodium Thiosulfate 12.5gm IV over a 10minute period in order to sequester and rid the body of Cyanide. Assisted ventilation may also be necessary.
 - d. **Pulmonary Agents:**
 - i. No current antidotes are available. Supportive therapy must be initiated.

CWP-TE TESTS

OUTCOME: The patient/family will understand the role of testing in appropriate management of exposure to chemical weapons

STANDARDS:

1. Discuss that certain lab tests may be required after exposure to a chemical weapon.
 - a. **Nerve Agents:**
 - i. RBC cholinesterase activity (severe symptoms usually present with greater than 70% cholinesterase inhibition)
 - ii. CXR or pulse oximetry recommended in severe exposures
 - iii. Routine labs, e.g., CBC, glucose, electrolytes
 - b. **Blister/Vesicant agents:**
 - i. WBC<500 can indicate vesicant exposure
 - ii. Routine labs
 - c. **Blood Agents:**
 - i. Routine labs/pulmonary function
 - d. **Pulmonary Agents:**
 - i. Routine labs/pulmonary function
2. Discuss why lab tests are used for patient monitoring purposes.
3. Explain what test(s) will be ordered. Provide information on the indication, benefits, and risks of the tests.
4. Explain how test results will be used to guide therapy.

CWP-TX TREATMENT

OUTCOME: The patient/family will understand the possible treatments available after exposure to a chemical weapon.

STANDARDS:

1. Explain that the treatment plan will be made by the patient and the healthcare team after reviewing available options.
2. **Nerve Agents:** Atropine should be continued at 5–10 minute intervals, until the adequate resolution of symptoms (Secretions have diminished and breathing is comfortable). Continue Diazepam if required for the prevention of convulsions. Phentolamine (5mg IV for adults, 1mg IV for children) can be used for 2-PAM induced hypertension.
3. **Blister Agents/Vesicants:**

- a. Mustard Blisters: Apply a one-eighth of an inch thick layer of mafenide acetate or silver sulfadiazine cream to be used as a topical anti-bacterial. If the blister worsens to an infected state, appropriate antibiotic therapy should be sought.
- b. Inhalation of Mustards: In cases of severe RT injury, where a pt is infected with a pneumonal infection, aggressive antibiotic therapy is required
- c. Mustard ingestion: In treating systemic symptoms 0.4-0.8 mg SQ Atropine may be useful in reducing GI activity. If the victims' white blood cell count were significantly reduced, isolation and appropriate antibiotic therapy would be needed.

4. Blood Agents: See above for post-exposure prophylaxis.

5. Pulmonary Agents:

- a. Antimicrobial treatment is reserved only for cases of acquired bacterial bronchitis/pneumonitis.
- b. At sufficiently high doses of these agents, pulmonary edema is more than likely to follow. In these cases, large doses of steroids must be administered as soon as possible, preferably started within 15 minutes of exposure.
- c. Dexamethasone Na Phosphate: 4 puffs must be inhaled at the earliest possible time, then 1 puff q 3 mins until irritation has subsided. After this, 5 puffs q 15 minutes to total 150 puffs. Following this, 1 puff q 1h daily, with 5 puffs q 15mins to total 30 puffs in preparation for nighttime sleep. This regimen should be continued for at least 5 days.
- d. For treating life threatening situations, the above inhaled regimen should be supplemented with the following:
 - i. Day 1: 1000 mg IV prednisolone
 - ii. Day 2: 3800 mg IV prednisolone
 - iii. Day 3: 5700 mg IV prednisolone
 - iv. Beginning day 6, systemic CS dose should be reduced, provided the CXR remains clear
- e. If the patient is pre-disposed to pulmonary infection complications, adjuvant antibiotic coverage should also be considered.